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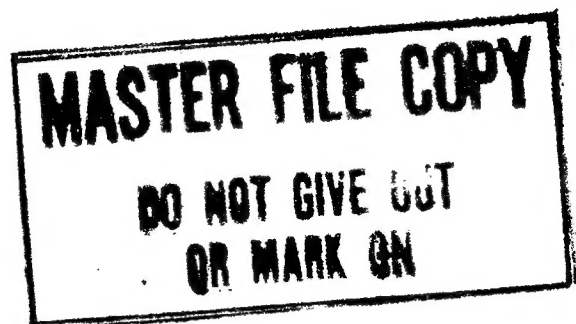
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Big Four: Growing Divergence in Financial Capital Costs

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A Research Paper



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Big Four: Growing Divergence in Financial Capital Costs

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A Research Paper

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**Big Four: Growing
Divergence in
Financial Capital Costs**

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Foreword

Analysts frequently argue that high financing costs put US firms at a disadvantage compared with companies in other major countries, lessening the ability of US firms to improve facilities or to aggressively pursue new investment strategies. The recent surge in US interest rates has widened this financial gap, particularly vis-a-vis Japan, and enhanced, some argue, other relative advantages held by foreign competitors.

This report examines trends in financial capital costs through 1981 and analyzes some of the causes for existing differences in Japan, France, West Germany, and the United States. The estimates do not apply to international comparisons for any given industry. Furthermore, these costs are only one element in corporate investment decisions, which must also consider overall corporate goals, the cost of physical capital, cash flow, depreciation regulations, expected returns to investment, inflation and exchange rate changes, and the availability of long-term funds.

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**Big Four: Growing
Divergence in
Financial Capital Costs**

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Overview

The cost of capital for corporations in Japan, France, West Germany, and the United States has risen rapidly during the last decade, but the rise has been smallest in Japan. In 1981 Japanese industrial corporations on average faced financial capital costs only about half as high as US firms—roughly 9 percent versus almost 17 percent. The cost for West German firms was close to that in Japan; the cost for French firms was higher but still below that in the United States. The spread is considerably greater than it was throughout most of the 1970s. Thus, US firms now are more disadvantaged than their foreign competitors. Specifically:

- The range of profitable investments is narrower for US than foreign companies. The higher capital costs faced by US corporations increase both the absolute investment threshold and the uncertainty attached to a firm's ability to recover investment costs.
- US corporations require higher profit margins for capital-intensive products than their foreign competitors. In strong price competition, this disadvantage may deter US investors from challenging foreign firms or substantially limit, if not eliminate, their profits should they compete.

Capital costs for Japanese, West German, and French firms have traditionally been lower largely because of institutional factors:

- Foreign lenders charge a lower risk premium on business loans, in part because corporate earnings are less variable than in the United States.
- Japanese and West German firms benefit from close and sustained ties to their banks. French firms similarly benefit from substantial support by government-backed banks. These relationships, in turn, have allowed foreign firms to rely much more heavily on debt finance and thus to gain substantially from the tax deductibility of interest payments.

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The capital cost gap between the United States and Japan and West Germany has widened in recent years because of the greater return demanded by US lenders to compensate for the higher rate of inflation in the United States. The gap would have been even greater, however, if foreign governments had not matched a portion of the inflation-induced rise in US rates to quell the flight of interest-sensitive funds. Greater internal competition for funds from the West German and Japanese Governments also played a role in raising interest rates in these two countries.

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Cost of Capital to Corporate Borrowers

Firms in the four major industrial countries—the United States, Japan, West Germany, and France—are paying record or near-record rates for money when recession and political uncertainties have dampened investor expectations for returns to investment. The weighted after-tax cost of capital for industry in these four countries soared to an average of almost 12 percent last year, nearly double the rates that prevailed in the early-to-mid-1970s.¹ The combined impact of these two forces dramatically reduced the rate of capital investment in manufacturing in 1974-80 (table 1).

The cost of capital is a guiding element in corporate investment decisions and a significant determinant of firm profitability.² A firm can undertake investments that will generate a return below its cost of capital but that will still earn adequate profits in an accounting sense. Over the long run, however, regular investments in projects below the firm's cost of capital would, other things remaining equal, drive the firm's investors to other more profitable and less risky investments.

Not only do higher capital costs thus constrain investment opportunity but they also significantly increase the degree of uncertainty attached to investments. For a given project, the closer a firm's cost of capital is to the expected return from investment, the higher the probability that actual returns will not exceed capital costs. The firm with the lower cost of capital can be more certain of covering its costs for any given investment.

¹ The average weighted cost of capital includes the cost of debt and equity for nonfinancial corporations weighted by their shares in the aggregate corporate balance sheet. All costs of capital data used in this paper are calculated on an after-tax basis. See appendix A for details.

² *Cost of capital* does not refer solely to the cost of external funds for specific projects but to the opportunity cost of using funds from all sources—external or internal. The assumption is that all funds can be priced the same as the next dollar of capital raised in the market. Furthermore, the concept assumes that a firm's debt/equity proportions will remain the same as it generates additional capital. (To do otherwise implies that the debt/equity ratio is not optimal and that a shift to higher or lower leverage is appropriate.)

Table 1

Real Gross Capital Formation for Business

	Average Annual Percentage Increase	
	1967-73	1974-80
United States	4.5	2.0
France	7.0	1.9
West Germany ^a	6.2	1.5
Japan	13.5	2.3

^a Includes housing investment.

Source: OECD. *Quarterly National Accounts Bulletin*, 1981.

The importance of capital costs to investment decisions varies by industry.³ The capital intensity is often far greater in high-technology areas; according to industry sources, \$1 of capital investment is required for each \$2.50 in annual revenues for the latest generation of 64K random access memory devices.

The impact of capital cost differentials can be considerable. Last year, when US corporations typically faced a weighted cost of capital of 16.6 percent, the total cost of a \$100 million investment amortized over 15 years was over \$275 million. In Japan, where the weighted cost of capital was only half as high, this same investment cost \$182 million or one-third less. Even allowing for differences in relative depreciation schedules, the stream of returns necessary to cover capital costs is much higher in the United States than in Japan.

³ Not all corporations consider a detailed cost of capital analysis before investing. A recent survey found that a significant number of firms did not take adequate account of inflation, for example, in projecting potential return on investment. However, the large manufacturing corporations typically do try to meet or exceed their average cost of capital when weighing investment alternatives.

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Big Four: Capital Formation and Its Financing ^a

The cost of capital is an important—but not the only—factor in determining the level of a nation's industrial capital formation. The latter occurs within a larger frame of reference—overall net capital formation—which is shaped by a variety of other national economic, regulatory, and behavioral characteristics. Net capital formation as used in the following table consists of additions to business inventories plus net fixed investment—additional structures and equipment, including newly produced housing. This concept of net capital formation depicts a

nation's annual additions to its stock of real assets, a major portion of which is associated with the manufacturing sector.

As indicated in the table, the United States devotes substantially less of its gross domestic product to net capital formation than Japan, West Germany, and France. Between 1972 and 1979, Japan increased its volume of net capital formation substantially, drawing on a large pool of household savings.

	Billion US \$			
	United States	Japan	West Germany	France
1972				
Net capital formation (as a percent of GDP)	8.2	22.1	15.9	16.1
	95.3	93.0	71.6	37.1
Sources of financing				
Net personal saving	56.2	51.9	41.8	22.2
Net business saving	24.7	25.0	10.1	6.6
Net government saving	5.3	25.3	21.3	9.3
Net rest of world	9.1	-9.1	-1.6	-0.9
1979				
Net capital formation (as percent of GDP)	6.4	18.9	13.7	12.3
	149.8	188.9	104.3	67.8
Sources of financing				
Net personal saving	86.2	135.6	62.9	54.9
Net business saving	19.8	19.9	20.2	5.3
Net government saving	24.2	24.4	15.1	7.8
Net rest of world	19.6	9.0	6.2	-0.2

^a Because of rounding, components may not add to totals shown.

NOTE: Derived from *National Accounts of OECD Countries, 1962-79*, non-US data converted to US dollars at 1979 exchange rates.



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Cross-Country Comparisons

The cost of capital facing corporations in the United States, Japan, West Germany, and France rose substantially over the past decade.⁴ With the exception of the United States, costs rose in 1972-74, fell during 1975-77, only to rise again beginning in 1978. In the United States there was little downward movement in 1975-77. This resulted in a widening divergence in capital costs relative to foreign corporations by the end of the period.

Our calculations show that, for the group as a whole, the cost of capital rose to nearly 12 percent last year, up from 7 to 8 percent for most of the 1970s. Among the four, only Japan has managed to keep rates in line with historic levels (table 2). Firms in the United States, in contrast, pay nearly 17 percent today—roughly double the average for the 1970s. Although rates in France and West Germany are lower than the US average, these countries also have financing costs well above those paid during the early-to-mid-1970s. More importantly, from a competitive standpoint, rate spreads between countries have widened dramatically. Last year, the average cost of capital faced by US corporations was roughly double the rate in Japan and substantially above West European levels (figure 1).

To get some sense of the reasons for the differences in capital costs faced by corporations in the United States, Japan, West Germany, and France we separated the average weighted cost of capital into three major components:⁵

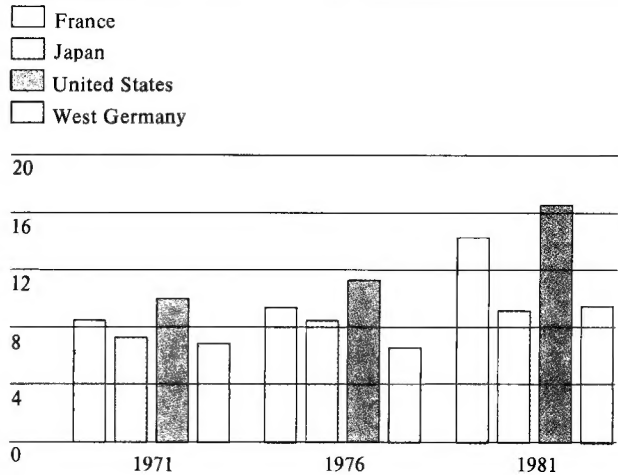
- The "risk-free" rate for capital.
- The risk premium demanded by lenders to compensate for the uncertainty attached to corporate performance.
- The impact of tax deductions allowed corporations for interest payments, the so-called leverage effect.

⁴ To determine financial capital costs faced by manufacturers in the four major countries, we compiled an aggregate balance sheet for manufacturing firms in each of the countries and assigned costs to equity plus each type of debt. These costs were blended into a single cost of capital based on the weighted average of the source of corporate funding. The cost of short-term bank loans was based on the prime commercial rate. Long-term costs were either bond rates or commercial lending rates, depending on the degree of reliance on bonds or loans as funding sources. The cost of equity capital was determined by adding a risk factor—based on dividend yield and stock price appreciation—to the risk-free long-term rate as approximated by government bonds.

⁵ See appendix B for a detailed description.

Figure 1
Big Four: Average Weighted Cost of Capital to Industry

Annual Percentage Cost



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Risk-Free Rate. The risk-free rate for capital is defined as the yield on 10-year government securities. It can, in turn, be viewed as containing two components: the inflationary expectations of lenders and a real price for capital.

Our calculations show that *inflationary expectations* are the largest single factor behind the relatively high cost of capital to US industry. The inflation factor in US capital costs last year was 9.6 percent compared with 2.6 percent in Japan and 4.6 percent in West Germany, where inflation rates have been much lower over the last five years.⁶

The uneven inflationary performances in the late 1970s, which led to this divergence, resulted from differences in government policy. Tokyo and Bonn

⁶ The inflation components were determined by using a six-quarter geometrically distributed lag of the gross national product deflator; this, it is assumed, approximates the investor's view of what will happen to inflation over the next several years.

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Table 2

**Estimated Average
Cost of Capital to Industry**

	France	United States	Japan	West Germany
1971				
Risk-free rate	8.6	6.2	7.3	8.0
Inflation	6.0	4.9	5.8	7.8
Imputed real rate	2.6	1.3	1.5	0.2
Risk premium	3.0	5.7	4.1	1.6
Imputed leverage effect	-3.1	-1.9	-4.1	-2.7
Cost of capital	8.5	10.0	7.3	6.9
1976				
Risk-free rate	10.4	7.6	8.7	7.8
Inflation	7.2	5.1	6.8	3.5
Imputed real rate	3.2	2.5	1.9	4.3
Risk premium	2.9	5.7	4.3	1.3
Imputed leverage effect	-3.9	-2.0	-4.5	-2.5
Cost of capital	9.4	11.3	8.5	6.6
1981				
Risk-free rate	16.6	12.9	8.7	10.5
Inflation	11.6	9.6	2.6	4.3
Imputed real rate	5.0	3.3	6.1	6.2
Risk premium	3.5	6.4	4.6	2.6
Imputed leverage effect	-5.8	-2.7	-4.1	-3.6
Cost of capital	14.3	16.6	9.2	9.5

chose to combat actual and latent inflationary pressures more strongly than recessionary problems; monetary authorities in both countries held the growth in money supply to rates well below previous norms. In contrast, the US and French money stocks grew much more rapidly as Washington and Paris focused on reducing unemployment from the high levels of 1975.

A second key factor in the differential inflation rates of the 1970s appears to have been the wage policies of the various countries. In Japan and West Germany, a labor-business-government consensus that inflation had to be kept in check led to very moderate nominal wage gains. In contrast, the French Government's greater emphasis on maintenance of real earnings permitted larger wage increases; rises in wage rates were also relatively rapid in the United States.

Finally, the differentials in inflation appeared to be magnified by positive feedbacks between domestic inflation and exchange rate movements. In Japan and West Germany, low domestic inflation contributed to appreciation of their currencies, which in turn lowered imported inflationary pressures. In France and the United States, where domestic inflation was more rapid, the international feedbacks tended to boost inflation.

The *after-inflation, or real, cost of corporate capital* has risen sharply in recent years in the three foreign countries to rates ranging from 5.0 percent to 6.2 percent. Japanese firms encountered the greatest absolute increase over the last five years—up 4.2 per-

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centage points from 1.9 percent in 1976. The real rate in the United States, in contrast, rose moderately to an estimated 3.3 percent last year.

The real rate was estimated by netting imputed inflationary expectations from the yield on government bonds—a proxy for a nation's risk-free rate for capital. It is determined by a combination of factors, but the key ingredient remains the flow of and competition for loanable funds from national household sectors. Recently, however, the level of US interest rates has also played a role in determining the real cost of capital abroad.

The four nations in question experienced falling saving rates over the past decade, slowing the increase in the supply of loanable funds:

- Household saving rates vary significantly internationally—from a high of 18.5 percent of disposable income in Japan to 5.0 percent in the United States. With the exception of France, household saving rates are currently well below the levels of the mid-1970s partly reflecting slower growth in real incomes and higher effective tax rates.⁷
- Corporate savings rates fell sharply during the 1974-75 recessionary period but—with the notable exception of Japan—rose during the remainder of the decade. Uncertain economic prospects have kept fixed capital expenditures below cash inflows for French and German corporations; the two nations have become significant net lenders to the rest of the world.

On the demand side, growing government borrowing in capital markets appears to have been a major factor behind the rise in the real price of capital available to foreign corporations. Budget deficits in Japan, West Germany, and France have continued to escalate, while monetary policy has become far more restrictive to contain inflation. Central banks, as a result, have purchased a smaller proportion of the growing number of government securities issued to finance the

deficits. With a greater burden placed on private savings to absorb central government debt, the funds available to the private sector have, in most cases, been insufficient to prevent a substantial rise in the interest rates firms must pay for borrowed capital.

The impact has been greatest in Japan because of the dramatic increase in government borrowing. Government debt issues took 43 percent of the domestic credit supply in 1979, up from only 15 percent in 1971. The increased competition from the Japanese treasury was a key factor in the increase in the estimated real rate for corporate capital—from 1.5 percent in 1971 to 6.1 percent last year:

- In France, central government borrowing, as a share of total credit raised, increased from less than 2 percent in 1971 to 12 percent in 1979.
- Bonn's demands on the West German credit market also increased substantially during the 1970s, from 11 percent in 1971 to 19 percent in 1977.

US corporations, in contrast, found increasing direct competition for loanable funds from the financial and household sectors during the 1970s. While government borrowing as a share of total demand for funds fell substantially, direct household demand rose by 9 percentage points, to more than one-third of total demand for funds. The share of financial institutions more than doubled as they increased their capital base to support additional lending.

While the market for investment capital remains largely domestic in nature, higher US nominal interest rates may have led foreign governments to raise the real cost of funds in their capital markets. Despite lower domestic inflation, foreign monetary authorities have, to varying degrees, followed the upward movement in US interest rates by raising central bank discount rates. Failure to have done so would have resulted in outflows of interest-sensitive funds to dollar assets, currency depreciation, and ultimately increased inflationary pressures on the domestic economy.

Risk Premium. There are significant international differences in the risk premium demanded by lenders and investors to compensate for the uncertainty of

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The Financial Market Structure

Financial markets in Japan, France, and West Germany were reorganized after World War II to ensure that capital would flow to industry. Bond and stock markets remained relatively undeveloped for a long period with household savings flowing mainly to banks which, in turn, became major holders of corporate capital. The pattern of corporate-lender relationships that has evolved has substantially affected risk assessment and corporate debt levels in these countries.

Japan. *The Japanese financial system was designed to enhance the ability of banks and financial authorities to allocate credit to industry. Japanese companies, until recently, have had little alternative to bank borrowing. The authorities have kept bond yields artificially low and have rationed the volume of issues. Until recently, stock could only be issued at par, making stock issues a costly way of raising funds. Although measures have been taken to improve corporate alternatives to bank lending and to free somewhat the flow of capital in and out of the country, Tokyo has remained content with the limited nature of the capital market—a system consistent with its objective of steadily increasing industrial output.*

The small number of major banks in Japan—13 city banks backed by nationwide branch networks—has centralized the supply of investment capital, allowing major corporations to raise funds efficiently. Strong competition for corporate business and banks' ability to loan at 100 times equity—as opposed to 25 times equity in the United States—have kept interest rate spreads reasonable for major corporate customers. More importantly, central bank supervision has often kept interest rates below market levels. As a result, the major city banks periodically need Bank of Japan refinancing and thus become subject to government guidance on the allocation of loans among industries. This guidance bolsters banker confidence in the ability of targeted borrowers—firms integral to Tokyo's vision of industrial development—to sustain high debt levels.

Although most commercial bank lending is short term, explicit or implicit rollover agreements allow Japanese corporations to view short-term loans as long-term liabilities. Investment risks are, in fact, substantially reduced by a large home market remote from foreign competition and, in many cases, by the internal demand of highly integrated Japanese firms. Lending institutions, for their part, rely less on balance-sheet criteria in making loans. The corporation's bank(s) usually has a detailed knowledge of firm affairs. The bank counts on the firm as a stable source of loan demand and, in return, implicitly guarantees that funds will be available to the company, even if it means recourse to temporarily uneconomical sources of funding. Thus, Japanese bankers take a long-term view of firm prospects and base lending on the corporation's traditional profit and growth record, capacity for innovation, and potential for growth as measured by its position within the industry.

France. *The French capital market is characterized by an extremely complex set of financial intermediaries, most under government control, which channel household savings into corporate investments. French firms depend heavily on bank lending to supplement internal funds; in the 1970s, domestic financial institutions supplied over 75 percent of the funds raised by French corporations. The banking institutions are funded from postal savings, life insurance, and annuity accounts, which provide a tremendous flow of savings—more than 20 percent of personal income—at relatively low rates. The French stock market has traditionally been somewhat thin, and the bond market has been dominated by the nationalized industries and special credit institutions.*

The Banque de France exercises close control over the amount and cost of financial assets available to firms. It sets annual ceilings for increases in bank lending, with specialized provisions for favored categories such as export credits and housing. It also sets interest rates on the money market and fixes rates offered to household savers through the key savings

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instruments. As in Japan, commercial banks rely on central bank refinancing of medium- and long-term industrial loans and are thus subject to administrative guidance. The Banque also offers refinancing facilities at preferential interest rates to authorized credit institutions.

The commercial banks are dominated by three government-owned banks—Banque Nationale de Paris, Credit Lyonnais, and Societe General. These were nationalized in 1945 and currently account for roughly 70 percent of all deposits placed in France's 275 deposit banks. Although these three banks operate as private institutions, the chairmen and managing directors are appointed by the government, and each bank has a government representative on its board of directors.

The central government further influences business behavior via interest rate rebates on long-term industrial loans, largely to small and medium-sized firms, made by special credit institutions such as the Credit National and Credit Hotelier. Investment funds provided by these institutions are often raised on the French bond market under government guarantee. Direct loans by the Credit National make up about 5 percent of all industrial finance in France. The bank has tended to take the lead in the development of national interest industries. French commercial banks have not been particularly supportive of riskier long-term investment in recent years. Bank profitability has been depressed by the artificially low government regulated lending rates, and government-imposed ceilings have limited the total amount of credit that may be extended.

Citing French commercial bank caution in lending—specifically the excessive weight accorded short-term profits in deciding among potential borrowers—the Mitterrand government has nationalized an additional 39 commercial banks. As a result, the nationalized banking sector directly or indirectly accounts for 97 percent of all resident deposits and 93 percent of all loans. The government hopes that this additional

control will enable it to ensure that lending criteria are adjusted in favor of long-term investments judged to be in the national interest.

West Germany. In the West German financial system, a few large banks are crucial in attracting long-term deposits and relending to industry. The central government has not taken advantage of the financial system to guide lending activities. Financial policies are generally macroeconomic, with sectoral assistance provided by specific lending institutions. The banks own and control major blocks of corporate stock and thus often play a major role in decision-making. Corporations rely heavily on bank credit and are highly leveraged. An active secondary market for corporate bonds does not exist, and the stock market, aside from being depressed, is thin. Equity has traditionally been costly to market.

The interlocking relationship between the financial and industrial sectors is perhaps greatest in West Germany. Besides voting their own corporate shares, banks generally receive authorization to represent the interests of customers whose stock they held on deposit. In 1980 banks voted an average of 63 percent of corporate shares in the 74 largest West German corporations; the big three banks alone accounted for 35 percent of the shares voted. Bank directors sit on and frequently chair business supervisory boards; 570 bank executives, for example, are on the supervisory boards of the top 400 companies.

As financial advisers and large holders of voting rights, banks have the potential to exert considerable influence on corporate behavior. At a minimum, banks are interested in ensuring that decisionmaking is consistent with long-term return to capital and thus the ability to repay the extensive long-term bank exposure. The firms benefit from the information bankers bring to the boardroom and from the greater degree of certainty that financial support exists for corporate decisions.

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corporate performance. Our calculations for 1981 show that US corporations bear the highest premium for corporate risk; 6.4 percent compared with 2.6 percent in West Germany, 3.5 percent in France, and 4.6 percent in Japan.⁸

The divergence in the risk premiums in part reflects differences in earnings variability among countries. An analysis of the variability in aggregate corporate earnings for these four countries indicates the greatest fluctuation in France followed by the United States, Japan, and West Germany. In addition, private investors in Japan, France, and West Germany may demand lower nominal risk premiums because favorable tax provisions enable them to obtain the same after-tax yield on investments from lower nominal returns. French investors may write off the first 5,000 francs in share income and may claim a tax credit for 50 percent of dividend earnings from resident corporations. West German shareholders may claim a tax credit for 55 percent of all dividends, while Japanese taxpayers may exclude the first 100,000 yen in dividend income from a Japanese corporation.

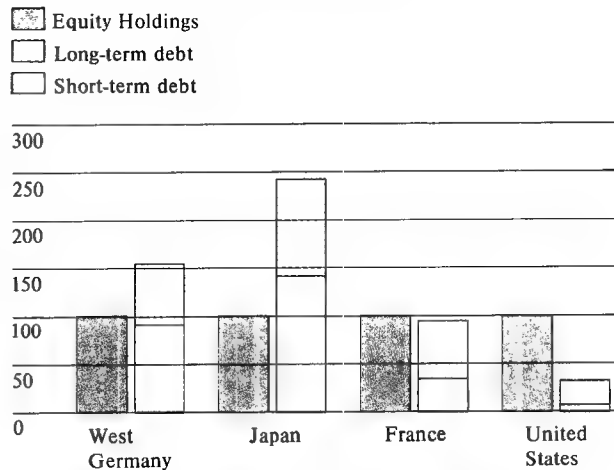
The Leverage Effect. Foreign corporations benefit from a close and longstanding relationship with lending institutions, which results not only in relatively low-risk premiums but more importantly in an assured supply of funds. These tendencies are strengthened in France by direct government lending and in Japan by commercial banks' confidence that they have little to risk in lending to firms targeted by Tokyo for expansion. Rapid corporate expansion in the 1960s and early 1970s, facilitated by the close relationship between banking and industry, has led to high debt-to-equity ratios. In France and Japan, the ratio of borrowed money to equity is, on average, 2 to 1 compared with a 1 to 2 ratio in the United States (figure 2).

The financial benefits to leveraging are significant. Interest on borrowed capital is a tax-deductible business expense whereas dividend payments—the return on equity-capital are taxed as part of corporate earnings. The impact is particularly great in the

⁸ *Business risk* is the premium attached to the sensitivity of corporate performance to changes in business climate. It is calculated by adjusting the observed cost of equity capital by the degree of corporate leverage.

Figure 2
Big Four: Composition of Corporate Liabilities, 1979^a

Percent (Value of Equity Holdings=100)



^a Manufacturing sector for Japan and West Germany; French industry; all nonfinancial institutions in the United States; French data for 1978.

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United States where distributed income is taxed at normal corporate rates. In Japan, France, and West Germany, the advantages of leveraging are reduced to some extent by tax breaks on distributed income, which were enacted to avoid double taxation of dividend income.

Implications for the United States

Firms paying relatively low capital costs have a distinct advantage in the international marketplace. First, they can undertake investments that their competitors would consider unprofitable. Second, when these firms compete against firms facing higher capital costs, they can price output at levels that would not be profitable for competitors or, by pricing at the competitors' level, derive a superior return on investment.

The US disadvantage in capital costs, in conjunction with a greater uncertainty about capital availability, may serve to reduce the willingness or ability of US

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corporations to engage in anticipatory or rapid capacity expansion or other high-risk investment. At the margin, it would seem to be easier for non-US firms, which are far less reliant on equity capital and thus less subject to short-term investor pressures, to undertake investments with below-cost-of-capital returns. US firms would tend to be downgraded by the investor ratings services, thus raising capital costs and thinning out the supply of capital.

The crunch caused by high financing costs in the United States will be particularly acute over the next year. Lenders are still demanding a large premium for their money. Moreover, with inflation headed downward, corporations cannot count on the ability to raise product prices in the future to offset high nominal financial costs. Hence, the uncertainty of investing is particularly great. In Japan, on the other hand, the relatively even inflation and cost-of-capital performance provides more certainty for investment in either new product development or improved facilities.

International differences in the availability and cost of capital to corporations may prove crucial in high-technology industries, where substantial benefits accrue to firms able to undertake rapid anticipatory expansion and thus experience decreasing costs as production increases. Rapid expansion enables a firm to obtain a lower cost, higher profit position than competitors. Once a lead is established in an industry, the leading firm tends to increase its lead through the rapid generation of funds for additional investment.

In the past, US corporations could count on superior production technology to shelter their market from foreign competition. Under these circumstances, they could be relatively assured of demand despite the profit margins needed to cover their relatively high cost of capital. In recent years, however, US technological advantages in key markets have been eroded by foreign competitors, principally Japanese firms. As a result, competition has become increasingly characterized by aggressive pricing and the ability to meet tight delivery schedules. Higher capital costs substantially disadvantage US firms under these conditions and, in some cases, may lead to the surrender of key markets to foreign competitors.

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Appendix A

The Average Weighted Cost of Capital: A Methodology

In this paper the cost of capital is defined as the minimum rate of return necessary to properly compensate investors—both debt holders and shareholders—for risks undertaken by investing in an enterprise. This cost of capital concept incorporates the external financing costs for specific projects as well as the opportunity cost of using funds from all sources—external or internal. The assumption is that all funds can be priced the same as the next dollar of capital raised in the market.

To avoid confusing the merits of an investment with the manner in which it is financed, a *weighted average* cost of capital is used in decisionmaking. This calculation is made, in turn, by weighting the cost of each component—short-term debt, long-term debt, equity—by the proportion of each in the total capital structure. It is assumed that a firm's debt/equity proportions will remain the same as it generates additional capital.

A balance sheet for manufacturing was used to analyze the cost of capital for industry as a whole. US balance sheet data were taken from US Department of Commerce figures aggregated by industrial sector. Japanese data were taken from Ministry of Finance compilations. French data, based on surveys of 500 manufacturing enterprises, were compiled for the OECD Financial Statistics series. West German figures, based on sample data from 45,000 firms, were also published in the OECD Financial Statistics.

The average weighted cost of capital for the manufacturing sectors in each of the Big Four countries was calculated using the following equation:

$$C_k = K_i (1 - T) \frac{B}{B + S} + K_e \frac{S}{B + S}$$

Where

K_i = Pretax cost of debt
 K_e = Cost of Equity
 B = Value of debt
 S = Value of equity
 T = Marginal tax rate

Value of Debt (B)

Traditional analysis of capital costs regards the value of bonds outstanding as a proxy for total debt. We have expanded this definition to account for the growing importance of short-term bank and other money market funding as a source of capital among US corporations and the traditional heavy reliance on bank debt in the three foreign countries. The value of debt used in our calculations thus consists of the balance sheet totals for short-term bank debt and long-term debt, including bonds. The short-term figures exclude accounts payable, which are an essentially costless form of short-term credit.

Pretax Cost of Debt (K_i)

The pretax cost of debt is the finance charge associated with the issuance of bonds or the drawing down of bank credit. Each type of debt has its own cost, depending on term, money market conditions, and other factors. An attempt was made to use interest rates that are comparable among the four countries and that reflect rates close to the actual charge on each type of debt. Data on exact rates charged on business loans are not published, but base rate figures are available for short-term (under one year) and long-term commercial lending and industrial bonds. The various interest rates—in each case annual averages of daily rates—were blended into composite debt costs for each country, based on the weighted average of the term segments making up total debt as compiled from the balance sheet data:

- For Japanese debt costs, the short-term *standard* rate of interest and long-term *top priority* lending rate were applied to the two categories of debt. The *standard* rate is the rate for the discount of first-class bills. It is regarded as the representative indicator of interest rates for short-term bank loans. The *top priority* lending rate for loans granted to Japan's basic industries is determined by agreement

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Table A-1

Percent

Big Four: Average Weighted Cost of Capital to Industry

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Japan	7.3	6.9	7.2	8.7	8.1	8.5	7.7	7.1	8.0	9.8	9.2
West Germany	6.9	6.6	8.9	8.7	7.1	6.6	5.9	5.4	6.7	7.9	9.5
France	8.5	7.8	9.3	11.1	9.4	9.4	9.6	9.7	9.4	12.1	14.3
United States	10.0	10.0	10.6	11.6	11.6	11.3	11.2	12.1	13.1	15.1	16.6

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between Japan's long-term credit banks and the Federation of Bankers Associations of Japan. It is, in effect, the basic rate for long-term bank loans.¹

- The French and West German short- and long-term charges are commercial bank lending rates as published by the central banks. Since the early 1970s, industrial bonds have lost much of their importance as an instrument for long-term borrowing by German enterprises. They have been largely replaced by loans against borrower's notes (*Schuldscheindarlehen*). Likewise in France, industrial bonds do not constitute a significant part of total long-term debt.
- For the United States, the commercial bank prime rate is used as a proxy for short-term costs. Since most US long-term debt is bond financed, the 10-year rate for triple-A industrial bonds was used as a proxy for long-term debt costs.

Value of Equity (S)

Equity consists of share capital and corporate funds held in reserve to cover anticipated future expenses and to protect against potential business losses. Year-end equity values for French and West German manufacturing firms were taken from central bank data; Japanese yearend equity values for manufactur-

ing firms are published by the Ministry of Finance in its *Quarterly Bulletin of Financial Statistics*. US equity figures were taken from Department of Commerce data.

Cost of Equity (Ke)

The cost of equity is the minimum after-tax rate of return that must be earned from an investment to compensate shareholders for business and financial risk. The commonly accepted method for estimating equity cost is to add the sum estimated for risk elements to an interest charge that represents compensation for an investment carrying virtually no risk.

Risk-Free Rate. The proxy for the theoretical risk-free rate in all four countries is assumed to be the issue rate for long-term central government bonds. An alternative would be secondary market yields on central government bonds. The difference between issue and secondary yields on central government bonds in the four countries has, for the most part, averaged under 1 percentage point in the past 15 years, with some widening in recent years. Because of the uncertainty over exactly what constitutes a realis-

¹ A bond rate was not used, since bonds were a negligible source of funding over the period 1971-81 as a whole. Although now growing rapidly, the market for industrial bonds in Japan is not yet large enough to meet a significant share of demand for long-term financing.

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tic market risk-free rate, we chose to use the central government issue yield.²

Risk Premium. Holding common stocks entails risk, because the actual return may differ from what is expected. This risk premium is generated from two components; a "market risk" premium, which compensates investors for the underlying variability in returns associated with holding stocks in general, and a "corporate risk" premium, which accounts for the variability in earnings of any given firm in comparison with the stock market as a whole.

For the United States, we determined a market risk premium from the results of a University of Chicago study.³ The study examined the rates of return earned on investments in long-term US Treasury Bonds and compared them with Standard and Poor's *500 Stock Index* from 1925 to 79. The average annual return on the Standard and Poor index was found to be 5.9 percentage points greater than the risk-free rate as approximated by government bond yields. We assumed that this premium (which was rounded to 6 percent) represents the market risk demanded by investors. We applied this methodology to determine the market risk premiums in Japan (9.7 percent), France (5.0 percent), and West Germany (3.0 percent). In each case long-term series for annual changes in common stock prices and dividend yields were summed and the average long-term central government bond rates for the years 1951-81 subtracted to derive proxies for market risk premiums.

² It has been argued that, because of the thin, undeveloped nature of bond markets in Japan and Western Europe, as well as government manipulation of public securities issues, the issue rates do not fully reflect market forces.

³ Ibbotson and Sinquefeld, "Stocks, Bonds, Bills and Inflation: Year by Year Historical Patterns, 1926-1974," *The Journal of Business*, January 1976. Updated periodically.

A further risk premium is demanded by investors to account for the variability in earnings for any single firm. To quantify this additional charge, we calculated risk indexes, or betas—the ratio of the volatility of the common stock to the volatility of the market as a whole—for every common stock. Multiplying the market risk premium by its beta will yield an estimated additional cost to compensate for the risk associated with a specific investment. Thus, the risk-free rate, plus the market risk premium times a risk index, yields an estimate of the cost of equity.

The risk premium for the manufacturing sector in each country was subsequently calculated by averaging firm stock-price volatility data (betas) for seven industrial sectors in the United States⁴ and deriving an average beta (1.11) for these seven sectors to yield a composite investment risk for manufacturing as a whole. In the absence of reliable foreign data, and because studies have shown that stocks within the same industry have fairly highly correlated price fluctuations, the average beta for the United States was used as a proxy for the three foreign premiums as well.

Marginal Tax Rate (T)

The blended cost of debt times its share of total capital, plus the cost of equity times its share of total capital, equals the estimated pretax cost of investment capital. To adjust for the effects of the tax deductibility of interest payments, the cost of debt is reduced by the effective tax rate on interest payments. Although specific tax provisions vary among the four countries, corporations generally were subject to an effective tax rate of 50 percent during the period under study. For this reason we used 0.5 as the marginal rate for all four countries.

⁴ Steel, chemicals, petroleum, nonferrous metals, general machinery, electrical machinery, and transportation equipment.

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Appendix B

Elements of the Cost of Capital

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The cost of capital as calculated in appendix A can be subdivided into three principal elements; the risk-free rate of return, the risk premium demanded by investors, and the interest rate savings accruing from the tax deductibility of interest payments. This presentation provides a framework for understanding the reasons behind international differences in capital costs. The table on page 16 shows these various elements for the four countries in 1981.

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Risk-Free Rate

The risk-free rate of capital, determined by issue rates for long-term central government bonds, is assumed to be representative of lender demands for guaranteed returns on investments. In effect, this rate can be viewed as an indicator of the supply and demand relationships affecting capital markets.

The inflationary component of this rate was estimated by applying a six-quarter geometrically distributed lag to national GNP deflators. The derived annual averages are assumed to be proxies for that portion of the risk-free rate that represents investor/lender expectations concerning the future rate of inflation. Other lags may be equally valid, but, unless the distribution were substantially changed, the impact on the results would not be substantial.

The underlying real rate of interest for risk-free capital was imputed by subtracting inflationary expectations from the risk-free rate. The real rate, in theory, represents the result of basic supply and demand factors, including the flow of household and corporate savings and the competition for funds among financial and nonfinancial institutions, the central government, and private individuals. The estimates should be regarded as indicative of trends rather than as precise numbers.

Risk Premium for Business

Corporations must pay lenders/investors an additional premium to compensate for the uncertainties

attached to business performance and, in particular, the variation in profitability over the business cycle. This "business risk" premium is independent of a firm's "financial risk," which stems from its capital structure, specifically its ratio of debt to equity and the composition of its debt.

The Imputed Leverage Effect

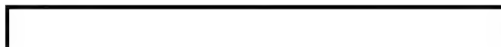
The impact of a firm's debt structure on its overall after-tax capital costs was derived by subtracting the risk-free rate and the estimated premium for business risk from the nominal average weighted cost of capital. The leverage effect is uniformly negative because corporate tax deductions for interest payments lower the effective rate faced by the firm. This benefit is partially offset, however, by the higher nominal rates faced by firms that depend heavily on debt financing. While a direct calculation of the leverage effect is theoretically possible, it would be exceedingly difficult because of the lack of hard information on the structure of and interest payments on outstanding debt and the exact degree of tax breaks provided to the corporation. The imputed leverage effects appear consistent with what would be expected given international differences in corporate reliance on debt financing, tax rates, and nominal interest levels.

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	Percent			
	US	France	West Germany	Japan
Risk-free rate	12.9	16.6	10.5	8.7
Inflation	9.6	11.6	4.3	2.6
Imputed real rate	3.3	5.0	6.2	6.1
Risk premium	6.4	3.5	2.6	4.6
Imputed leverage effect	-2.7	-5.8	-3.6	-4.1
Cost of capital	16.6	14.3	9.5	9.2



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